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RECEIVING REPORT

DATE OF REPORT: 16 June 1956

SECRET

RECEIVED: 27 May 1956

WAREHOUSE NUMBER: 64627-56

CARRIER	EXP.	FT.	P. P.	OTHER	GOV'T B/L NO.	PUR. O'R	REQ.	CONT'R	OTHER

[redacted] Task Order #4 50X1

56-9293

Requi: ISD-56-378

Vo: 15616-56

VENDOR

[redacted] 50X1

FOR	NAME	BRANCH	ADDRESS
	2612 Alcott Hall		6-7912-10-601 6-7918-10-601

ITEM	STOCK NO.	NOMENCLATURE (SERIAL & MODEL NO'S. IF AVAILABLE)	QUANTITY	UNIT	UNIT PRICE
		SC			
1		Engineering Model of Cylindrical type tape Recorder Reproducer as described Phase 1 of Technical Proposal	1	ea.	
2		Technical Engineering Report Describing Experiments and Results thereof of work performed on item 1 above	1	ea.	
		Ac. trk: 1 pc. - 220 lbs. - 14 cu. (RE)			

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SHIPMENT: COMPLETE XXX PARTIAL

DELIVERED BY

Inspected and verified as being in good condition in accordance with terms of agreement except otherwise noted.

SIGNATURE

I certify that the materials and/or services itemized above have been received in the quantity and quality specified except as otherwise noted.

DATE | SIGNATURE

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FORM NO. 505 USE PREVIOUS EDITIONS MISCELLANEOUS (15-33)

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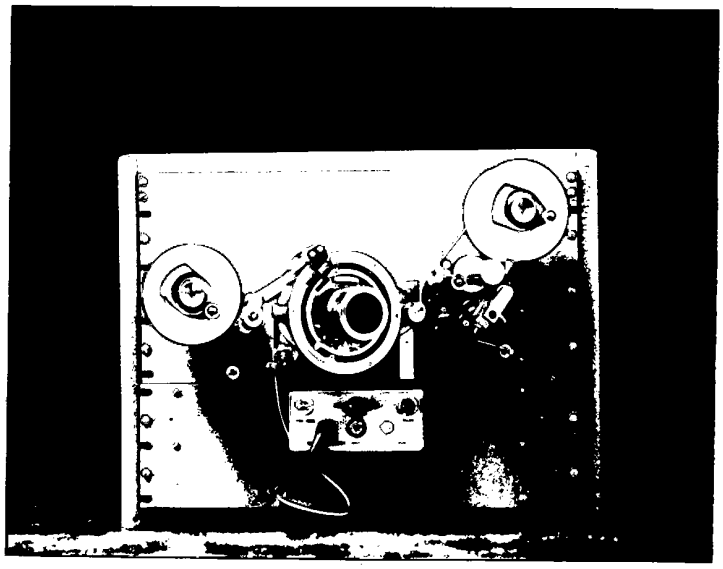
CYLINDRICAL TAPE RECORDER



SIZE:	Tape Transport Deck	19" w. x 7 1/2" h. x 15" d.
	Record-Playback Chassis	19" w. x 5 1/4" h. x 19 1/2" d.
	Cabinet	21" w. x 15 3/4" h. x 15" d.
WEIGHT:	69 lbs.	
POWER:	105-120 volts, 60 cycles	
TAPE SPEED:	3 3/4, 7 1/2, 15 in./sec.	
SIGNAL TO NOISE:	32 db.	
INPUT:	Min. .004 volt., Max. 30 volts across line input.	
TAPE:	1,000 mylar, 1.5 mil. backing, 1.5" wide.	
DRIVE:	1,800 R.P.M. synchronous motor	
AMPLIFIER:	(Overall frequency response with tape speed 7 1/2" or 15" per sec.) $\pm$ 3 db. 100-8,000 c.p.s.	
HEAD BIAS:	31 KC at 10 ma.	
*FLUTTER:	.5 - 1.5% at 3 3/4 in./sec., 1 - 2% at 7 1/2" per sec., 1 - 2% at 15" per sec.	

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*These readings were taken with the existing belt. Indications are a lighter.

Ful-Vu Ful-Proof Protector RF 3-11 Featherweight Pat. Pending

DESCRIPTION

This equipment is housed in a 21 x 15 3/4 x 15 rack type cabinet. The amplifier and associated controls are located in the lower portion, and the tape transport deck is located in the upper section. The transport deck is loaded from the front, and speed change lever is accessible by lifting the cabinet cover.

PURPOSE

The intent in the development of the Cylindrical Tape Transport Unit is to produce a unit capable of supplying sufficient technical information to make a study of the basic principles involved. Three speeds have been provided to enable a study of frequencies up to 30 KC (This frequency is limited by the particular tape head in use). The amplifier supplied is intended only to enable the user to make functional tests on the transport system, and as such has been designed to be flat (± 3 db) to 8,000 cycles.

The record/playback tape head used in the transport unit is of single core design (.03 in. thick). The electrical losses in this type construction do not permit the use of high frequency bias (140 KC) needed to permit the exploration of the entire frequency range. It is found, however, that when a bias of this frequency was used with a current of .5 ma., exploration of the range from 2,000 to 30 KC can be made (frequencies lower than 2,000 c.p.s. tend to become distorted). The bias frequency of the present amplifier is 31 KC. The record/playback head is not well shielded, and will, therefore, produce some hum variation if the transport mechanism is located in a strong magnetic field.

CONTROLS

The following five controls are located on the amplifier front panel.

a.	VOL. IND.	Lights when maximum head current is reached.
b.	OFF VOL.	Turns amplifier on and adjusts gain of record and playback.
c.	PILOT Lamp	Indicates amplifier is on.
d.	REC-STOP PLAY Lever	Switches from RECord to PLAYback function. The STOP position functions as a standby position.
e.	MON.	This jack is in parallel with the secondary of the output transformer (3 Ω imp.) and is used to monitor in record or playback function.
f.	LOAD-RUN	Not used.

The following controls are located on the back of the amplifier chassis.

a.	Input	The input jack (left rear facing amp. chassis) provides for a 50Ω microphone.
b.	Line Input	Eight screw terminals are located on the left hand rear of the amplifier (facing front of amplifier). The two lower left terminals are for 600 Ω line termination. The two terminals adjacent are center taps for the line and telephone termination respectively, and the last terminals are chassis ground.
c.	AVC Switch	Not used.
d.	Output	Used in playback only. Insertion of plug opens speaker circuit, and requires use of 3 Ω external termination.

LOADING OF TAPE

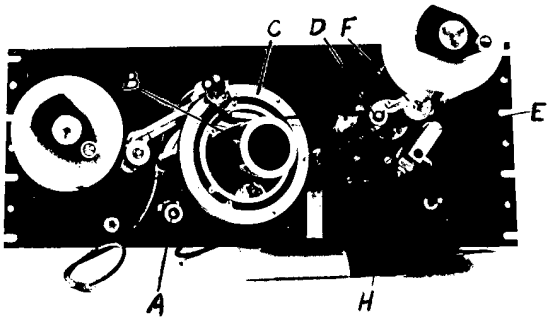


FIG 2

The record playback head is lifted from the mandril by placing a match stick under the counter balance weight. A portion of tape is unwound from the loaded left hand reel, passed under guidepost A (oxide surface up) and up between guidepost A and mandril B. The tape is then passed under the head ring C, looped around the mandril B, fed over guidepost D, and between the feed drive roller F, and pressure roller E. The pressure roller is released by pressing down on its arm and secured by pulling the latch back.

The drive system is so designed that the tape is forced to the front guide-collar of guidepost A and to the rear guide collar of guidepost D. The adjusting screws located on the center of these guideposts permit the necessary positioning of the tape on mandril B to insure clearance of the tape and the rotating tape head and to eliminate any gap between the tape at the [illegible]

RECORDING

1. Connect input circuit to line 1 and 2 terminals on rear of amplifier.
2. Place record-playback head jack in plug on front panel.
3. Place loaded tape reel on left hand spindle and lead as described above.
4. Remove match stick from head counter weight and engage pressure roller.
5. Turn the OFF-VOL knob to its center position.
6. Place the REC-STOP-PLAY lever in the REC position.
7. Turn VOL knob until VOL IND lamp just lights (input signal level should be .004 to 30 volts). If microphone is used, VOL IND lamp should just light on voice peaks.
8. Place the speed control lever (located inside cabinet directly behind right hand tape reel) to the desired speed. NOTE: Lever should be allowed to drop into place to insure good contact with the drive pulley.

PLAYBACK

1. Place the REC-STOP-PLAY lever in the PLAY position.
2. Place the match stick under head counter weight.
3. Release pressure roller.
4. While rewinding the tape on reel 1, unwind tape on reel 2. This prevents the tape from seizing on the tape mandril.
5. When the desired location on the tape has been reached, engage the pressure roller and remove match stick from tape head.
6. Set motor speed lever to desired speed.
7. Adjust VOL knob for desired output.
8. Adjust phasing control H (see Fig. 2) for greatest output.

TAPE ERASER

Tape must be bulk erased.

MAINTENANCE

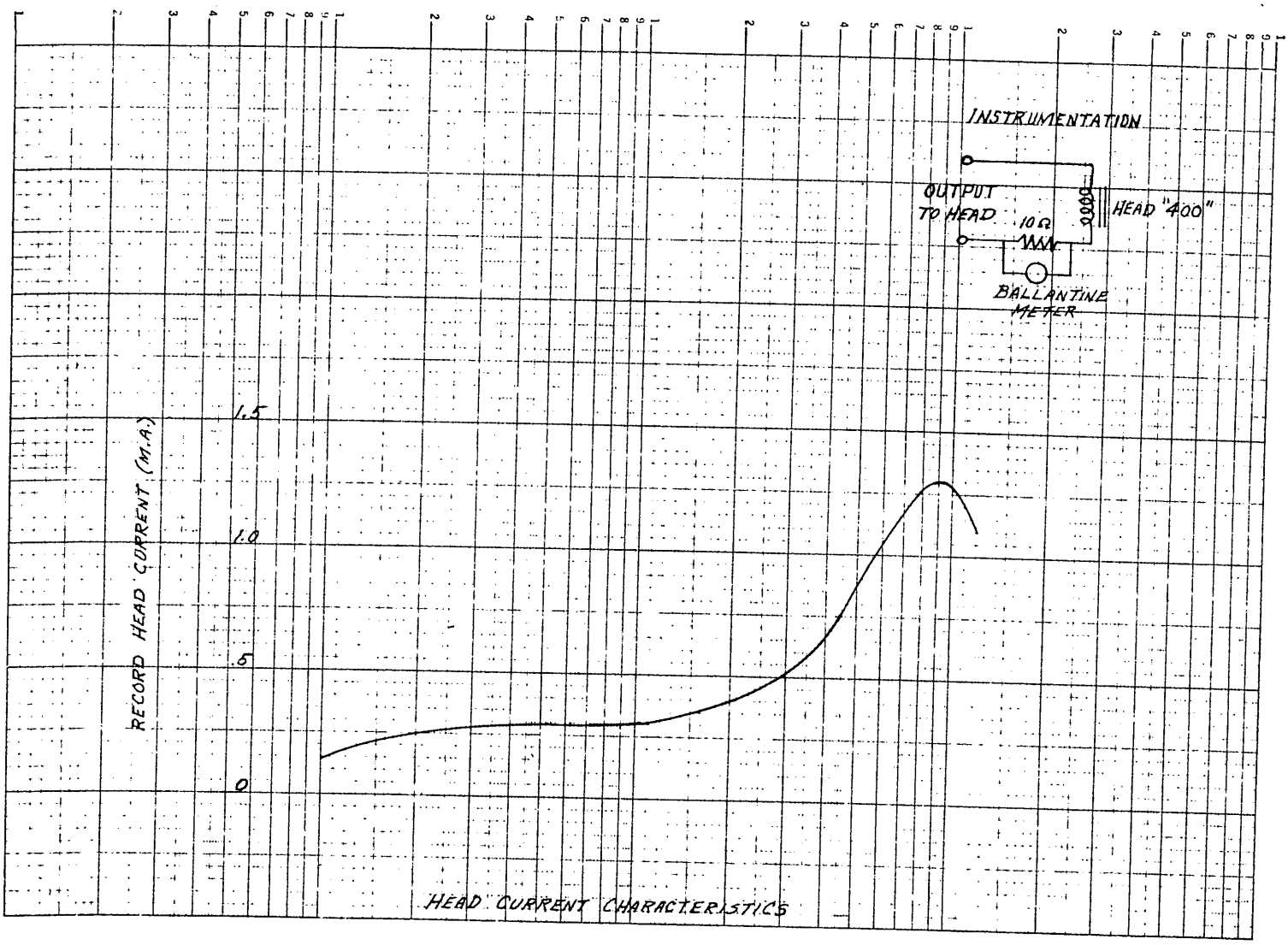
1. After running each reel of tape, it may be desirable to clean the vinyl strip on the tape mandril with a soft cloth and carbon tetrachloride. Failure to do this may cause seizing of the tape on the mandril with resulting slippage and speed variations.

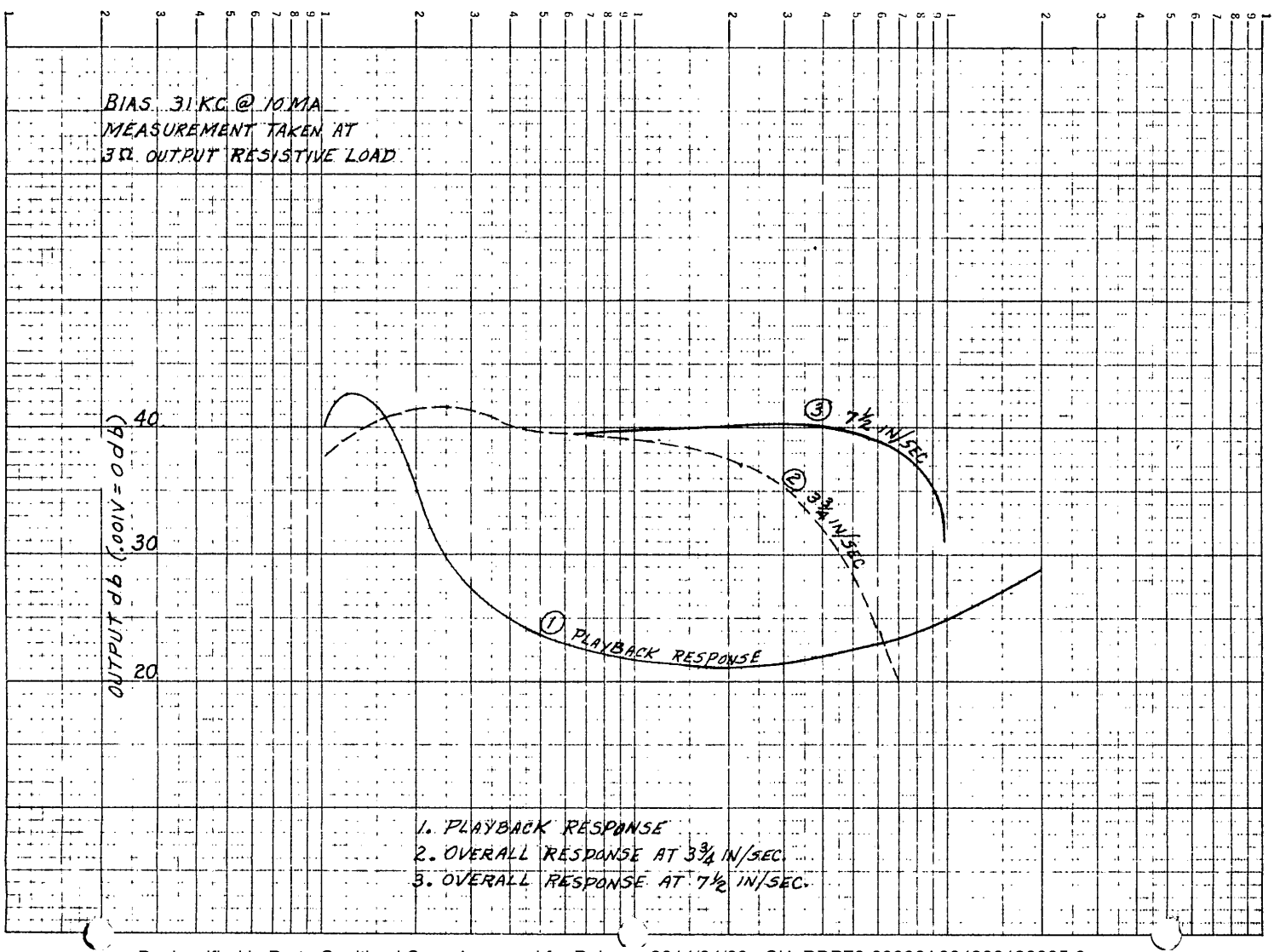
2. Exeessive oil between the tape head ring and the oilite bearing causes speed variations, particularly at higher speeds. In time, enough oil "weeps" from the pores of the oilite to cause this condition. When this occurs, the head ring should be removed and the bearing surface wiped with a soft cloth.

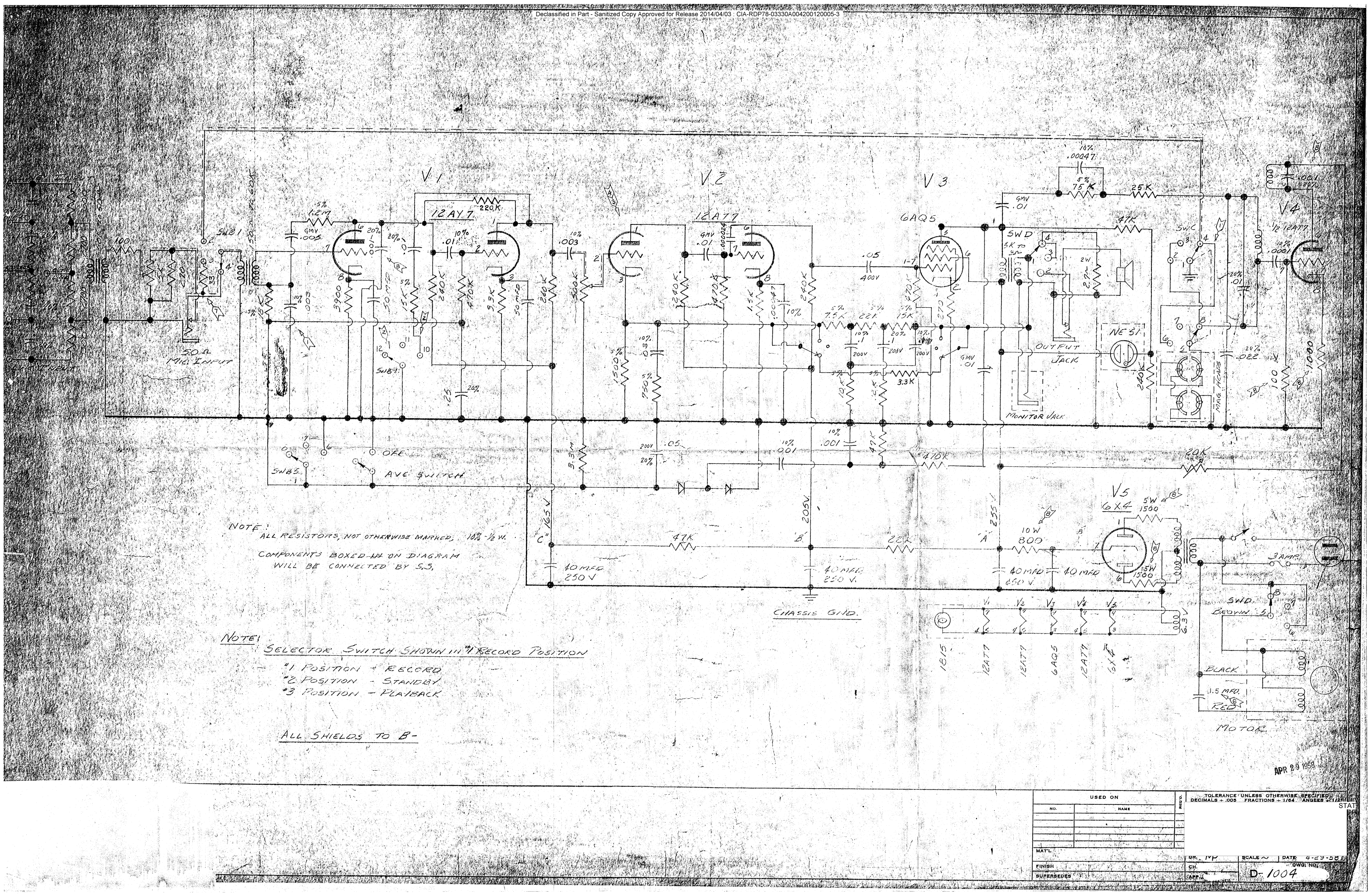
STAT

Project Engineer

April 28, 1958







CYLINDRICAL TYPE TAPE RECORDER

The Cylindrical Tape Recorder consists of a single rotating head contacting a diagonal section of wide, magnetic tape held in a cylindrical form by a metal tube. To date, two breadboard models have been made, and one semi-final model. The semi-final model is being delivered April 30, 1958.

The first breadboard was constructed with a head which rotated inside the tape loop. The head projected through a slot in the metal tube that supported the tape. The magnetic coating of the tape was in contact with the outer surface of the metal tube in the wrap around area. The disadvantages of this system were that head contact in the tape abutting area was poor, unless some kind of tape backing was used. When a pressure shoe of some sort was applied in the abutting area, the tape yield from the head pressure was different than the rest of the track area. This introduced recording radius variations which, in turn, produced disturbances in the recording. Another disadvantage was the high coefficient of friction between the magnetic surface of the tape and the polished surface of the supporting cylindrical tube.

The second breadboard utilized a single head which rotated around the outside of the tape loop. This permitted the smooth backing of the tape to slide around the supporting cylinder. The hard, metal tube, of course, could not be used as a backing or the recording track. To solve this problem, a groove was cut in the metal tube in the sound track area. This groove was filled with a soft strip of vinylite to serve as a yielding backing for the sound track.

The head was mounted on a rotating plate. This plate was permitted to rotate concentrically by an annular V groove filled with nylon balls which fitted into another identical V groove in the supporting plate. The two plates with the separating nylon balls were held tightly together by rubber tired rollers. This type of support was not entirely successful because of the slippage required between certain contact areas of the balls and the race. This introduced some variations in speed, which reflected in the recording speed.

Before design and construction of the semi-final model was started, it was agreed among parties concerned that it would be desirable to mount the head on a steel annular ring, sliding on a heavy supporting ring of oilite. A test on this system has indicated several problems. When close tolerances are held on this large bearing area, the viscosity and the oil film between the moving members presents a non-uniform load to the drive, which causes variations in the record speed. The higher the speed of the record head, the worse this condition becomes. If an extremely light oil or an extremely light film of oil is used, slight scoring is developed by the pressure of the drive belt. This scoring, of course, presents another serious speed variation. To partially solve this problem on the latest model, an idler pulley was placed adjacent to the head ring directly opposite the drive pulley. This idler pulley took all of the belt load from the rotating ring. The belt contact on the upper and lower portions of the head ring exactly balanced each other. Original tests with a very uniform belt showed considerable promise. The belts received for the final version, however, were slightly stiff and non-uniform, and introduced more head disturbances than on the first test. Since it takes several weeks, usually, to get special belts, it is necessary to deliver the equipment with the less desirable belt. We will attempt to get an improved belt of the proper length and forward it to the testing group as soon as possible.

Even with the smooth backing of the tape sliding in contact with the metal cylinder, the pull at the tape feed roller is very high. The slightest tension put on the tape at the entrance to the wrap around reflects in a terrific additional pull requirement at the feed roller. Even the head contact on the tape introduces a large variation in the feed roller pull requirement, depending on the head position. At times, this has been no problem, and at other times it has. Our test time has not been long enough to determine whether this is a serious problem or not.

The tape positioning mechanism seems to work very well. We have had no problem in maintaining accurate tape abuttment.

The magnetic head used on the model is a low frequency model. It is normally used over a 200 to 5,000 cycle range. We do not have available at this time a wider range head in this small size.

Also, the amplifier used in the model is for narrow voice range. There was not time for us to get into extending the range substantially.

We expect to be doing some work in expanding the range of our heads in the near future. We suggest that after the testing group has spent some time with the model, it be returned to our laboratory for some further refinement and extension of frequency range. We would do a certain amount of this in connection with one of our exploratory projects without further charge.

[redacted] 50X1

Chief Engineer

April 28, 1958